REMARKS

I. Introduction

Applicants respectfully request reconsideration and allowance in light of the amendments to the claims and arguments that follow.

Claims 1-4 and 6-75 are pending. Claim 1 is the sole independent claim. Claims 7-38, 41-47, 55, and 57-72 were previously withdrawn and claim 5 was previously cancelled.

Claim 1 has been amended to recite Applicants' invention with greater particularity. Specifically, claim 1 has been amended to require that a portion of the separator in the claimed MEA is not in contact with the catalytic materials on the cathode and anode, and that this non-contacting portion permits water to pass from the cathode side to the anode side. Exemplary support for this amendment is found in the specification at paragraph [0088]. Claim 6 has been amended to correct a clerical error in dependency. No new matter is added by these amendments.

Thus, claims 1-4, 6, 39-40, 48-54, 56, and 73-75 are under consideration.

II. Rejections Under 35 U.S.C. § 102(b)—Independent claim 1 is novel

Claims 1-3, 6, 39-40, 48, and 54 stand rejected under 35 U.S.C. § 102(b) as allegedly anticipated by Voss et al., U.S. Pat. No. 5,441,819 ("Voss"). Claim 1 has been amended to require that separator is adjacent to and interposed between the anode and cathode; that the catalytic materials on the cathode and anode contact only a portion of the first and second surfaces of the separator, respectively; that portions of the first and second separator surfaces not contacted by the catalytic materials are opposite one another; and that the portion of the separator that does not contact the catalytic materials permits water to pass from the cathode side to the anode side. Thus, amended claim 1 requires that a portion of the separator contacts the anode and cathode, but does not contact the catalytic materials thereon. Voss fails to disclose this feature.

Voss' separator does not include a portion that contacts the anode and cathode without contacting the catalytic materials thereon

Voss describes a MEA comprising a cathode, separator, and anode. As seen in Voss' Figure 1, illustrating a cross-section of the disclosed MEA, the separator (12) is interposed between and adjacent to the anode (20) and cathode (22). Voss describes that the anode (20) and cathode (22) are "provided with a coating or layer of catalytic material." Voss does not indicate that these catalytic material layers cover less than the entire facing surface of the anode and cathode. Therefore, Voss does not describe a portion of the separator that contacts the anode and cathode, but does not contact the catalytic materials of both the cathode and anode as required by the instant claims.

Voss does not anticipate claim 1, as Voss does not teach all of the required elements. Claims 2-3, 6, 39-40, 48, and 54 all directly or indirectly depend from claim 1, and thus are also not anticipated by Voss.

Voss' disclosure of impregnation of carbon fiber electrodes with Teflon

Applicants also note that Office points to Voss' disclosure of anodes and cathodes made by impregnation of carbon fiber paper with Teflon and asserts that this impregnation is capable of imparting ion conductivity thereto. Applicant submits that even if true (which Applicant does not concede), this disclosure does not meet the claim limitation that the catalytic material coated on a surface of the anode or cathode is a mixture of at least one catalyst component and at least one ion conducting material. Voss teaches incorporation of Teflon in the anode and cathode, not incorporation in the catalyst material.

The Office has also asserted that Teflon is an ion conducting material and has demanded that Applicants provide objective or scientific evidence that "Teflon does not transport ions, cannot conduct ions, or is incapable of transporting ions at all" (emphasis in original) in order to rebut the assertion.

In response, Applicant submits that the Office's characterization of Teflon (as used by Voss) as an ion conductive material is irrelevant to the pending claims because as described above, Voss does not describe a catalyst layer comprising a mixture of a catalyst material and any other material. However, Applicants reiterate their position taken in the Request for Continued Examination, filed June 4, 2009, in that the Office's characterization of Teflon as an ion conducting material is contrary to how Teflon is viewed in the art and how the term "ion conducting material" is used in the specification. As discussed at length in the Request for Continued Examination, Teflon is a renowned insulating material with no charge carriers in its structure to enable transport of ions.

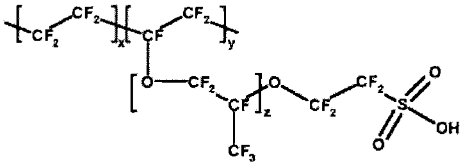
It is well established that "the patent application claims may be given their broadest interpretation consistent with the specification." In re Buszard, 504, F.3d 1363, 1366 (Fed. Cir. 2007). However, the interpretation must be reasonable. Id. at 1367 (citing In re Zletz, 893, F.2d 319, 321-22 (Fed. Cir. 1989)). Applicant submits that the Office's definition of the term "ion conductive material" to include any material that is not 100% absolutely incapable of conducting some minimal amount ions is not a reasonable interpretation of the term in light of the specification and how the term is used in the art. The Office indicates that the degree of ion-conductivity is not specified in the claims, and that a limitation from the specification (such as a requirement for high ion conductivity) will not be read into the claim. However, it is unreasonable to extend the definition of an "ion conductive material" to cover materials that may allow passage of some trivial number of ions in light of the teaching of the specification.

Voss' disclosure of perfluorosulfonic ion exchange membrane as a separator

The Office then points to Voss' disclosure of use of a perfluorosulfonic ion exchange membrane (i.e., Nafion) as a separator (i.e., an electrolyte membrane) and asserts that mixing of the catalytic material and electrolyte membrane necessarily (inherently) occurs at the interface of the catalytic material and the separator. Presumably, the Office considers this mixing sufficient to meet the claim requirement that the catalytic material comprises a catalytically effective amount of a mixture of at least one catalyst component and at least one ion conducting material. Applicants respectfully disagree.

Applicants first note that Voss does not describe, teach, or suggest incorporating an ion conducting material in a catalytic layer. Nor does Voss describe, teach, or suggest that ion conducting material from a solid polymer ion exchange membrane **12** in any way "mixes" with a catalytic layer **20** or **22**. Rather, Voss simply describes coating an anode and cathode with a catalytic material to form a catalytic layer. See Voss, col. 7, lines 60-62. No materials (including an ion conducting material as required by the instant claims) are contemplated as being mixed with the catalytic material in the formation of the catalytic layer.

As indicated above, Voss describes using perfluorosulfonic ion exchange membranes such as those sold by DuPont under the trade name Nafion. As described in the Request for Continued Examination, Nafion has a chemical structure similar to Teflon, with a carbon-fluorine backbone, but includes perfluoro side chains containing sulfonic acid groups:



According to DuPont's Safe Handling and Use literature, Nafion is a strong polymeric acid, but the sulfonic acid groups in the polymer are "essentially immobile and immersed in a fluropolymer matrix." See DuPont Nafion PFSA Products, Technical Information, p. 1, right column, submitted in an IDS herewith (emphasis added). The immobility of the sulfonic acid groups indicates that the polymer ion exchange membrane materials do not mix with adjacent materials when brought in contact to form an interface. Thus, Voss does not expressly or inherently describe, teach, or suggest a catalytic material that comprises a catalytically effective amount of a mixture of at least one catalyst component and at least one ion conducting material.

Conclusion

Voss does not anticipate claim 1, and any claims depending therefrom, for at least the reasons that: 1) Voss's separator does not contain a portion that contacts the anode and cathode, but does not contact the catalytic materials thereon; and 2) Voss does not expressly or inherently demonstrate a catalytic material that comprises a catalytically effective amount of a mixture of at least one catalyst component and at least one ion conducting material. Accordingly, Applicants respectfully request withdrawal of the anticipation rejection of claim 1, and any claims depending therefrom.

III. Rejections Under 35 U.S.C. § 103(a) – Independent claim 1 is non-obvious

A. Claims 1-3, 4, 6, 39-40, and 48, 54, and 73-75

Claims 1-3, 4, 6, 39-40, 48, 54, and 73-75 stand rejected under 35 U.S.C. § 103(a) for allegedly being unpatentable over Voss in view of Dhar, U.S. Pat. No. 5,242,764 ("Dhar"). Applicants respectfully traverse.

As described above, claim 1 has been amended to require that a portion of the separator contacts the anode and cathode, but does not contact the catalytic materials thereon. Applicants respectfully traverse the rejection of independent claim 1, from which the remaining rejected claims depend. Applicants further traverse the rejection of dependent claim 75 on additional grounds.

Voss' separator does not include a portion that contacts the anode and cathode, but does not contact the catalytic layers thereon

As described above, amended claim 1 requires a separator with a portion that contacts the anode and cathode, but does not contact the catalyst materials thereon. Voss fails to teach this feature.

Dhar does not correct this deficiency. Dhar describes a solid polymer fuel cell in which a slightly oversized solid electrolyte membrane with a hole cut out of the center is positioned between an anode and a cathode. Dhar makes no indication that a portion of the anode and cathode are not covered by a catalyst layer. In fact, in the exemplary cross-section of Dhar's fuel cell shown in Figure 2, the catalyst layers **36** and **38** are shown as covering the entire anode **18** and cathode **20**.

Additionally, Dhar's MEA includes solid electrolytes **22** and **24** positioned between the catalyst layers **36** and **38** and the electrolyte membrane **30**. Thus, Dhar is further deficient in that the electrolyte membrane is not in contact with any of the catalyst layers, anode, and cathode.

As such, Dhar does not describe a separator with a portion that contacts the anode and cathode, but does not contact the catalytic materials thereon.

Voss and Dhar, alone or in combination, fail to describe a separator with a portion that contacts the anode and cathode, but does not contact the catalytic materials thereon as required in the instant claims. Applicants respectfully request withdrawal of this rejection.

Voss and Dhar fail to teach the additional element recited in dependent claim 75

Claim 75 depends from claim 1 and further recites that the at least one ion conducting material is dispersed throughout the layer of catalytic material.

As described above, Voss and Dhar fail to describe a catalytically effective amount of a mixture of at least one catalyst component and at least one ion conducting material. The Office has asserted that mixing of a catalyst material and an ion conducting material inherently occurs at the interface of Voss' catalyst layer and solid polymer ion exchange membrane. Even if true, which Applicants do not concede, claim 75 requires more than just mere surface mixing. Claim 75 requires that the ion conducting material is dispersed throughout the layer of catalytic material. Applicants respectfully submit that the surface mixing alleged by the Examiner would be insufficient to disperse the ion conducting material throughout the layer of catalytic material.

Thus, Applicants respectfully request withdrawal of the rejection of claim 75 as obvious over Voss and Dhar.

Conclusion

Thus, Voss and Dhar, alone or in combination, fail to describe, teach, or suggest each and every element of independent claim 1. Specifically, Voss and Dhar fail to describe a separator with a portion that contacts the anode and cathode, but does not contact the catalytic materials thereon. Therefore, claim 1 is not obvious over the combined references.

The combination of Voss and Dhar is further deficient with respect to claim 75 for at least the additional reason that neither Voss or Dhar describe dispersing at least one ion conducting material throughout the layer of catalytic material.

Accordingly, Applicants respectfully request withdrawal of the obviousness rejection of claim 1, and any claims depending therefrom.

B. Claims 49-53

Claims 49-53 stand rejected under 35 U.S.C. § 103(a) for allegedly being unpatentable over Voss and/or Voss in view of Dhar. Applicants respectfully traverse.

As discussed above with respect to claim 1 (from which claims 49-53 ultimately depend), Voss and Dhar, alone or in combination, fail to describe each and every element of the instant claims. Specifically, Voss and Dhar fail to describe a separator with a portion that contacts the anode and cathode, but does not contact the catalytic materials thereon. Therefore, claims 49-53 are not obvious over the combined references. Accordingly, Applicants respectfully request that the present rejection of claims 49-53 be withdrawn.

C. Claim 56

Claim 56 stands rejected under 35 U.S.C. § 103(a) for allegedly being unpatentable over Voss alone or in view of Dhar and further in view of Biegert et al., U.S. Pat. Pub. No. 2004/0241531 ("Biegert"). Applicants respectfully traverse.

As discussed above with respect to claim 1 (from which claim 56 ultimately depends), Voss and Dhar, alone or in combination, fail to describe each and every element of the instant claim. As discussed above, Voss and Dhar fail to describe a separator with a portion that contacts the anode and cathode, but does not contact the catalytic materials thereon, as required by the instant claims.

Biegert fails to cure the deficiencies of Voss and Dhar outlined above. Biegert describes a MEA comprising an anode, a cathode, and a separator. Biegert makes no indication that a portion of the anode and cathode in contact with the separator are not covered by a catalyst layer. In fact, in the exemplary cross-section of Biegert's fuel cell shown in Figure 2, two catalyst layers (**4** and **unnumbered**) are shown as contacting the separator **5** across the entire anode **6** and cathode **7**. Biegert does not indicate that these catalytic material layers cover less than the entire facing surface of the anode and cathode. Thus, Biegert does not describe a separator with a portion that contacts the anode and cathode, but does not contact the catalytic materials thereon.

Therefore, Voss, Dhar, and Biegert, alone or in combination, fail to describe a separator with a portion that contacts the anode and cathode, but does not contact the catalytic materials thereon, as required in the instant claims. Accordingly, Applicants respectfully request that the present rejection of claim 56 be withdrawn.

CONCLUSION

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested. Should any issues remain open after consideration of the present amendment and reply, the Examiner is invited to contact the undersigned so that a prompt disposition of the application may be achieved.

The Commissioner is hereby authorized to charge any fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any additional extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorize payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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